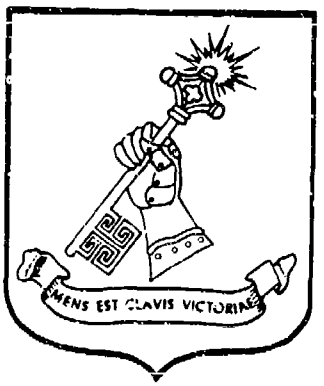
Modern Tactics in the Moral Domain: Smart Weapons and the Production of the Combat Stress Reaction

A Monograph
by

Major Thomas A. Kolditz
Field Artillery



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MONOGRAPH APPROVAL

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ABSTRACT

MODERN TACTICS IN THE MORAL DOMAIN: SMART WEAPONS AND THE PRODUCTION OF THE COMBAT STRESS REACTION by Major Thomas A. Kolditz, USA, 47 pages.

This monograph discusses offensive indirect fire tactics and their relationship to extreme fear responses. It examines the nature and causes of a specific, immediate, and debilitating fear response called the Combat Stress Reaction (CSR). Observations about how and why CSR occurs are based on U. S., Israeli, and Soviet sponsored psychological research reported in Section I of the monograph.

The monograph then examines historical examples of panic under indirect fire. The examples are from the Battle of the Somme in World War I, 1916, and in World War II, Guderian's breakthrough at Sedan 1940, the Vistula-Oder Campaign in 1945, and the fall of Berlin in 1945. Anecdotes characterizing individual experiences under fire also contribute to the historical analysis. Analysis of the historical accounts shows that specific features of weapons and specific tactics accompany panic and other fearful responses to indirect fire.

The monograph takes the principles derived from the psychological and historical research and proposes tactics, techniques, and design characteristics for smart weapons. It emphasizes increasing the fear-provoking aspects of the delivery without attenuating the intended physical destructiveness of the attack. The analysis proposes specific tactics for the 155mm and Multiple Launch Rocket System (MLRS) Sense and Destroy Armor (SADARM) counterbattery submunition.

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INTRODUCTION

Weapons aimed at soldiers can have at least three effects, either individually or in combination. The first, physical damage, is the most obvious and widely acknowledged weapons effect. Weapons can also cause the enemy to act or react logically and predictably, as in suppression, canalization, and blocking. Lastly weapons evoke powerful emotional responses--fear, anger, aggressiveness, panic, depression, withdrawal, and/or hopelessness. Armies carefully train soldiers and their leaders to minimize the influence of such emotions on the battlefield. The expression of emotion among soldiers undermines discipline, and indiscipline in battle often leads to failure. This paper analyzes the tactics of modern weapon design and employment as a tool for producing strong emotions that cause soldiers and units to become ineffective.

Section I reviews several psychological research reports that suggest key variables in the production of extreme fear responses, and includes a working definition of combat stress response. Section II contains historical accounts of the tactical significance of psychological effects in general, and extreme fear responses in particular. Section III offers an analysis of the first two sections and then applies that analysis to propose specific tactics and design characteristics for new and emerging indirect fire weapons. The intent is to combine psychological and historical research with tactical judgment, and to learn something new about using the enemy's fear as a combat multiplier.

The study of offensive psychological warfare receives little attention in the military psychology literature. In the recently published Handbook of Military Psychology, only one of the thirty nine featured articles has

anything to do with fighting an enemy.[1] The articles primarily concern taking care of friendly psychiatric casualties, or making correct personnel selections, or the effects of various deprivations on motor skills. While these articles are useful to medical practitioners and may have implications for the study of leadership, they have limited value for most warfighters. One goal of the present paper is to show the utility of such research in planning and executing fires.

Not surprisingly, few analysts have researched the emotional effectiveness of weapons and their employment techniques. One reason for this apparent lack of interest is that people experience fear and other emotional responses personally, and hence express emotional effects subjectively. Emotions such as fear or panic are also difficult to predict and usually transitory, and no rational planner would base the success of an operation solely on such effects. Lastly, much of the recent research on the production of fear holds restrictive security classifications, thus limiting its dissemination, popular understanding, and use.

Despite the subjective and unpredictable aspects of emotions, there are historical precedents for the tactical production of fear. Before considering anecdotal evidence, however, this paper will examine and define the various fearful responses shown by men during and following attack.

Section I

Research Review: Acute Stress Reactions In Response to Military Threat

Just as the ability to reproduce is necessary for the survival of a species, so too is a response to threat necessary for the survival of individuals. In humans, the two most common emotions felt in threatening situations are fear and anger. Among mentally healthy people who perceive their lives are at risk, the experience of fear is so common that for the present purpose one may consider it universal. Clearly, the majority of soldiers exhibit fear in battle as an adaptive response to threat.[2]

In a classic early study about fear in battle, John Dollard interviewed 300 American veterans of the Spanish Civil War, about half of whom were wounded.[3] Fear emerged clearly as a normal response; 74% of respondents reported experiencing fear when going into action for the first time. In addition, among those who saw subsequent action, 55% reported being sometimes afraid, and 36% reported being always afraid, when going into later battles. 59% of Dollard's veterans admitted that there were moments when they were too cautious and thus had their efficiency reduced by fear. His most relevant finding was that 61% of the informants, "lost their heads for a moment, couldn't control themselves and were useless as soldiers for a little while."[4] Fearful responses, then, were recognized in early research as having tactical significance at the small unit level.

A purely intuitive analyst might argue that soldiers fear weapons because they logically (and correctly) believe that the weapons will kill or injure them. Researchers discovered, however, that the production of

fear responses was more than a simple assessment of the probability of becoming a casualty. Goldhamer and a group of associates[5] developed a simple statistical comparison of the fearfulness of a weapon versus its casualty-producing effects. They asked wounded and unwounded groups of Chinese and North Korean prisoners of war (POWs) to rate which weapons they feared the most, and independently asked which weapons the POWs felt caused the most casualties. They then divided the proportion of judgments identifying a weapon as being most fearful by the proportion of judgments identifying the weapon as causing the highest number of casualties. They referred to this ratio as the Fear-Casualty (F-C) Ratio.[6]

Table 1 shows the F-C ratios for the three major categories of weapons in the Goldhamer et al. study. The "Weighted Average" column merely adjusts the results for the uneven sample sizes of the wounded vs. not wounded Chinese and North Korean troops. Scores over 1.0 indicate that POWs reported a class of weapons as more fear than casualty producing. Conversely, a ratio of less than one indicates the opposite.

TABLE 1
Fear Casualty Ratios
for Major Weapons Classes

Weapons	POWs	Wounded POWs	Weighted Average
Air Wpns.	1.11	1.57	1.22
Artillery	.95	.78	.91
Infantry Wpns.	.95	.50	.74

Clearly, the tabular F-C ratios suggest that, at least among the captured North Korean and Chinese troops, the fear producing aspects of weapons

were not determined solely by their perceived effectiveness in producing casualties, and that the finding was particularly in evidence among the wounded. This result shows quantitatively what seems intuitively reasonable--that certain aspects of weapon design or employment enhance fear. It is possible, then, that fear responses might serve as a legitimate goal of offensive tactics, techniques, and procedures, in addition to the more fundamental goal of physically destroying the enemy.

To identify ways to enhance fear effects, it is useful to focus on the specific reasons, other than fear of becoming a casualty, that cause soldiers to fear weapons. Researchers at Johns Hopkins University's Operations Research Office (ORO) conducted an interview study of 350 Chinese and 69 North Korean prisoners of war to investigate the reasons for fearing weapons.[7] Prisoners were able to respond freely about their reasons for fearing the United Nations force weapons, reasons which included casualties, noise, the efficiency of the weapon in action, burning, restriction of activity, the invulnerability (or lack of vulnerability) of the weapon system, property damage, and breakdown of morale. As one might predict, "casualties" was the most likely reason given for fear--by 232 of the 419 prisoners interviewed. Significant other causes emerged as well.

"Efficiency" of the weapon (such as rate of fire of a machine gun) was a cause. Seventy nine respondents reported that the efficiency of the weapon in action caused them to experience the most fear.[8] Thirty four of the prisoners reported that it was the weapon's ability to restrict their

activities that made them most fearful of the weapon. Twelve of the prisoners said that it was the noise of the weapon that caused the most fear. Eight soldiers cited invulnerability of the weapon as the most important fear-producing characteristic. Miscellaneous effects such as property damage and various morale effects accounted for fifty four responses.

This study conceptually replicates the Goldhamer et al. work by showing that the fearfulness of a weapon is not determined merely by its ability or propensity to produce casualties. The study broke new ground--it was one of the first to systematically assess which of the many weapons characteristics were responsible for eliciting fear (as opposed to merely cataloging which weapons were most feared). This research approach is potentially useful as a way to identify design characteristics or employment techniques which caused weapons to evoke fear in the past. Such techniques could then form the basis for forecasting or comparing the relative capabilities of new or developing weapons in eliciting strong fear responses among enemy troops.

Other studies support a focus on the psychological effects of specific weapon signatures. In 1961, Stanford researchers conducted a detailed investigation of the suppressive effects of various indirect fire weapons.[9] They were interested in the ability of bursting weapons to maximize both physical lethality and immediate suppression of enemy direct fire. Although the work did not specifically focus on debilitating fear, the researchers were able to develop tactical "rules of thumb" for signature effects. They found that the ability of a bursting weapon to suppress direct fire was consistently 40% beyond its lethal radius.[10]

The research approach proved useful not only applied to individual bursts, but to the effects of massed fires as well. A 1951 RAND Corporation study sought to integrate observations from WWII conventional bombing and the nuclear strikes on Hiroshima and Nagasaki.[11] The intent was to identify consistent themes about the causes of panic reactions and debilitating fear. Although the study focused primarily on civilian behaviors, one would expect soldiers--particularly poorly trained soldiers--to exhibit the same basic emotional processes to some degree.

RAND associated seven of their findings with the incidence of severe fear reactions. Such reactions occur most frequently (or tend to be worse) when:

1. A high proportion of the population is effected, but escapes; in other words, has a near-miss experience;

2. When the weapon warned of its own effects, as when a V-1 motor shut off:

3. When the pattern of raids had variable or long intervals, as opposed to reguiar, short intervals;

4. When inadequate medical or rescue facilities existed;

5. When activity was somehow limited after the raid;

6. When high explosives (as opposed to incendiaries) were used; and,

7. When attacked at night.[12]

RAND also analyzed the information to uncover adjustment mechanisms, that is, the specific things people tended to do to relieve their fears during or immediately after a raid.

Clearly, such coping or adjustment mechanisms have considerable military significance. Interfering with the coping strategy would assist in turning what is essentially a normal fearful response into a stronger, more debilitating one. In addition, from a leadership perspective it is important to understand the mechanisms by which men cope with life under fire. The adjustment mechanisms identified were:

1. Satisfying curiosity about bomb damage--it helps to view the destruction first-hand;

2. Discrimination of danger cues--people become less fearful as they come to recognize when they are vulnerable;

3. Increased communicativeness--talking about the experience reduces anxiety;

4. Avoidance of social isolation--most people face danger better when they are with other people than when they are alone;

5. Fatalistic attitudes--"If your name is on a bomb it will get you, otherwise not, so why worry?";

6. Taboos, rituals, and superstitions-- obsessive or illogical behaviors give the illusion of control; and,

7. Feelings of invulnerability--most often engendered by a series of remote exposure to bombings. It is the conceptual opposite of the anxiety created by a near-miss experience.[13]

Given the findings in this early RAND study, two distinct vulnerabilities exist. Certain aspects of the situation appear to cause or enhance fear. Subsequently, in response to the experience of fear, individuals perform specific behaviors to adapt or cope with their fear. It follows logically that the interruption of such coping strategies might cause the fear response

to be more intense or to endure. Ideally, offensive planners should understand and, where possible, target both vulnerabilities.

Despite the potential for identifying weapons characteristics that elicit fear, it seems unlikely that researchers will successfully develop a reliable or valid psychological scale to measure the psychological effectiveness of weapons. In 1964 a psychologist at the University of Oklahoma Research Institute, R. A. Terry, attempted to construct such a scale following a detailed quantitative review of the literature on the psychological effects of weapons.[14] He found only one study that met the design prerequisites for developing a psychological scale.[15] Terry never gave reasons for the lack of sufficient research. There are, however, at least two reasons why attempts to quantitatively scale psychological effects of weapons will achieve only limited success.

First, battle has a low tolerance for research. Virtually all of the research on fear in battle is gathered not in battle, but through interview or survey techniques afterward. Such methods are among the most difficult to use in the construction of psychological or psychophysical scales because significant and uncontrolled periods of time elapse between the experience and its measurement.

Second, battle is complex. Extreme fear responses are not true "weapons effects" because there is no evidence to suggest that weapons alone cause these responses. In virtually all cases the extreme fear responses develop in the context of a complicated situation with multiple physical threats.

Despite the difficulty he encountered in creating a scale, Terry was able to acknowledge three common elements that a psychological scale would consider.[16] The first, psychophysical effects, addresses sensory

characteristics, such as the the visible and audible signatures of weapons. The second, psychological effects, addresses beliefs about weapon capabilities (such as accuracy and lethality) and processes by which they change (such as adaptation or coping). Last, psychosocial effects, would include level of morale, leadership, training, and cultural determinants. This focus on isolating common elements may prove to be a more practical approach to studying fear effects, when compared to scaling techniques. Scaling techniques are more appropriate for laboratory or other experimental conditions that are more controlled than battlefield or post-battle settings. Findings from controlled experiments hold little value for most serving officers.

Serving officers value principles or techniques that help them to multiply combat power. Armies that make extensive use of artillery and aviation expect that enemy soldiers' emotional responses to combat will significantly reduce enemy combat power. The behavioral changes that accompany acute fear gain increased tactical significance when synchronized with ground attack. Artillery fire planners in the former Soviet Union made such synchronization the goal of their offensive fire plans. Although they expected only 25% destruction of dug-in troops and equipment from their heaviest modern tactical barrage, they predicted that virtually none of the remaining 75% would be capable of responding to a synchronized attack, due to the short-term psychological effects of the bombardment[17]. These effects do not correspond to the suppression effects one might achieve with a few rounds in the vicinity of an observation post or defensive position. They instead correspond to a paralyzing stress reaction (an involuntary emotional response) that is likely to last several minutes or even hours, as opposed to the thirty

seconds or so of suppression effects described in U.S. tactical doctrine.[18]

Combat Stress Reaction

This reaction that the Soviets, perhaps overconfidently, predicted is familiar to students of battlefield psychology. In World War I, the effect was termed "shell shock" because researchers had postulated that the physics of blast overpressure from shelling caused the reaction.[19] In World War II, the effect was thought to be caused by internal psychological conflicts and referred to as "war neurosis."[20] In that same period, other researchers focused on the etiological contribution of long-term operations and coined the terms "combat exhaustion" and "battle fatigue."[21]

Most recently, researchers recognize the term "combat stress reaction (CSR)" as the acute fear reaction associated with the stress of battle, bombardment, and, perhaps, natural and man-made disasters. It is typically characterized by, "an acute and severe reduction in the subject's functional capacity and by a subjective experience of overwhelming anxiety and inescapable threat."[22] In simple terms, CSR occurs when a soldier becomes frightened so badly that he or she ceases to function as a soldier.

CSR occurs in sufficient numbers to have tactical significance on the battlefield. Psychiatric researchers estimate the average incidence of CSR to be from 10% to 22% of the total number of physical injuries.[23] The Israeli Defense Force estimated that the 1967 and 1973 Arab Israeli wars that the incidence was between five and eight percent.[24] An assessment of the psychological casualties during Israel's 1982 Lebanon

war estimated CSR casualties to be approximately 25% of the total number injured.[25]

It is difficult to account for small variation in the CSR percentages from one war to the next, although one may propose reasons for trends. For example, both the U.S. Vietnam War and the war in Lebanon generated higher than anticipated levels of CSR. Some Israeli analysts propose that the common cause was lack of popular support for both war efforts.[26] Such trend analyses are probably as close as CSR will come to visibility at the strategic level of war. One would expect CSR percentages to increase during wars characterized by intense Soviet-style bombardment, although the numbers of killed and wounded might also ascend, but in a steeper curve, yielding a seemingly attenuated effect. Furthermore, it is impossible to estimate how many KIAs were in CSR at the time of death, or how many WIAs were effected at the time of their wounding.

Most personnel replacement strategies focus on medical, or at least obvious psychological, casualties. CSR can manifest itself more insidiously. One of the most difficult stress responses for commanders to deal with is palliation, a "process of psychological denial by which a soldier under extreme stress seeks to regress mentally into better times,"[27] often by simply falling asleep. During the Falklands War, Argentine soldiers pounded by British air and naval gunfire on Wireless Ridge dealt with the problem by, "retiring to their sleeping bags to dream the battle away."[28] Consider the challenge to tactical commanders to sort out simple physical exhaustion from CSR, given that both instances render the individual a passive participant in the battle. In neither instance would replacements be forthcoming.

One aspect of the effect of CSR on unit readiness is that units normally do not evacuate the majority of soldiers experiencing CSR. Depending on unit replacement policies and the severity of the soldier's reaction, it may be possible (and is desirable) for a soldier to receive treatment at unit level. The Israeli treatment model--widely considered to be the international standard for treatment--emphasizes treatment at, or as near as possible to, the front lines.[29] If the process is not managed carefully, deployed units might include some soldiers who are temporarily incapable of fighting, but have no justification for personnel actions resulting in replacements.

In addition to the immediate tactical effects of CSR, there may be longer term effects as well. In 30% to 45% of CSR cases, the reaction develops into a chronic syndrome: Post Traumatic Stress Disorder (PTSD).[30] Researchers have given far more attention to PTSD than to CSR, for several reasons.[31] First, PTSD affects soldiers' post-war adjustment and thus has an enduring negative effect on peacetime societies. Successful treatment therefore has significant social value. Second, from a practical standpoint it is much easier to study chronic mental illness after war than transient mental illness during war. Lastly, from the standpoint of a psychologist's or psychiatrist's social consciousness, it is more acceptable to effect a cure outside the context of battle than to focus on CSR during battle (which might lead to the soldiers immediate return to combat duty, or to the offensive use of the research findings).

The following description of the early phase of CSR serves to highlight the differences between soldiers' normal fear and the more acute response:

1. Emotions are strong enough to interfere with task accomplishment.

2. The level of distress of the individual is significantly more pronounced than that of others who are exposed to the same conditions.

3. Tension is beyond the subject's control and, very typically, does not lessen during periods of relaxation in combat.

4. The subject's behavior or responses seem to others different from his usual character.

5. The subject himself becomes detached and isolated.[32]

During the acute phase of CSR, soldiers exhibit marked psychological impairment, with many of the following signs in evidence: anxiety, confusion, agitation, shock, panic, terror, disorientation, and inappropriate responses to events.

Combat stress reaction can debilitate soldiers and thus have tactical consequences. It is therefore desirable to link conditions that appear to cause the response with offensive tactics. Personality characteristics may predispose a small number of soldiers to CSR[33], but situational variables are more predictive than personality in the production of CSR. Obviously, a threatening situation of some kind is necessary to produce fear in normal soldiers. Most importantly, commanders have no control over the personality of the enemy soldiers, but may exert control over delivery characteristics and other aspects of the enemy's perception of threat.

Table 2 is an outline of the situational factors that contribute to the production of debilitating fear. Note that Table 2 isolates only abstract variables that predispose individuals to experience a more acute fear response. Note also that several of the factors found in Table 2 were also reported in the earlier RAND study.

TABLE 2

RISK FACTORS OF COMBAT STRESS REACTION

1. Factors related to the conditions of combat
   - -intensity
   - -unpredictability of stressor
   - -lack of clarity in information
   - -failure of leadership
   - -death or replacement of a leader
2. Factors related to the soldier's task
   - -isolation from the his/her unit
   - -being the new soldier in a unit
   - -passive role (driver, technician)
   - -lack of adequate military training
   - -overexposure to casualties
   - -exposure to atrocities
   - -death of a friend
3. Physiological factors
   - -sleep, food, or water deprivation
   - -exhaustion due to weather conditions [34]

It is useful to review historical as well as psychologists' descriptions of CSR causes and effects, for at least two reasons. First, to argue that CSR has tactical significance, one must be able to point to historical evidence of the effects of debilitating fear on the ability of men and units to do battle. Second, training scenarios (e.g. Combat Training Center (CTC) rotations) and training simulations (e.g. Battle Command Training Program (BCTP) iterations) are primary developers of soldiers' and commanders' peacetime knowledge about how units behave in combat. One can compare the outcomes of these training events to battles in history, but the contemporary training events do not approximate the effects of fear on soldiers. It will be easier for military professionals to estimate the effects of CSR if it is reflected historically in the performance of units.

Section II

Historical View of Combat Stress Reaction

One must use care in studying combat stress reaction by interpreting history. There can be many causes for battlefield events, and CSR is but a single tactical level contributor to the eventual outcomes. For example, there is no support for the contention that CSR--even in great numbers--is necessary or sufficient for battlefield panic. Men break and run for a variety of reasons.

S. L. A. Marshall recounts an incident during the Carentan Causeway fight on 12 June 1944, when the better part of a battalion broke and ran.[35] The cause, however, did not appear to be incidents of combat stress reaction. One of the noncommissioned officers leading the fight received an arterial wound and immediately rushed to the aid station for help. His squad, unaware of his predicament, broke and ran. Other squads followed suit and a panic ensued. Recently historians have questioned Marshall's credibility,[36] but in this case his anecdote is plausible.

Others report observations similar to Marshall's. In 1918 an American infantry battalion serving as a regimental reserve broke in the face of light shelling.[37] The battalion commander was inspecting his position when he was told to report to the regimental command post. Within earshot of the troops, he told his adjutant, "Come on, let's beat it," and began to run toward the CP--and away from the enemy. The commander's men misinterpreted his words and actions as cowardice and panicked. Within a minute the battalion had passed the commander and ran for almost six miles before they were stopped.

Clearly, then, panics are not necessarily precipitated by CSR. It would also be incorrect to assume, however, that historical anecdotes are of no value to the study of fear. To the contrary, historical anecdotes help to convey the tactical, even operational, relevance of such fear. The researcher, though, must focus not only on the outcome, but on the precipitating events and their relationship to the research presented earlier. While such a cross-disciplinary analysis may lack a high degree of scientific rigor, it is logical, useful, and a legitimate way to examine the art of war.

Nightmare on the Meuse

The ability of weapons to elicit fear out of proportion to destructive performance contributed to one of General Heinz Guderian's greatest victories. On 12 May, 1940, Guderian's XIX Panzer Corps received an order to cross the Meuse River near Sedan, in northeastern France.[38] The 1st Infantry Regiment of the 1st Panzer Division was to lead the attack across the Meuse into the defensive positions set by the 55th French Infantry Division and the 147th Fortress Infantry Regiment.

The 1st Panzer zone included a large oxbow of the Meuse that protruded north into an open plain northwest of Sedan. It was a mixed blessing for both the Germans and the French. Such battlefield geometry was advantageous for the Germans because it effectively formed a three kilometer salient that the French could not easily occupy and defend. It also provided the French with a focus for heavy concentrations of indirect fire, because the Germans would have to mass for the crossing and remain massed until they could break out of the southern plain of the oxbow. Guderian no doubt realized that supporting fires could become decisive in the battle for Sedan's crossing sites.

Guderian needed air support. The 1st Panzer had its organic divisional artillery, consisting of the 73rd Artillery Regiment and the 2/56 Artillery.[39] They also received an additional reinforcing battalion from each of the adjacent divisions. The French, by contrast, had ten battalions of artillery, totaling 174 tubes, available for action on the morning of 13 May.[40] Guderian coordinated with the Second Air Corps commander General Lorzer for continuous air support at medium intensity to ensure suppression of the French artillery. General Ewald von Kleist, commander of the Panzer Group, overruled Guderian and ordered that the air attack be changed to a brief but massive bombardment coordinated with German artillery.[41]

Fortunately for the 1st Panzer Division, General Lorzer's staff received General von Kleist's change to the air order with insufficient time to effect the significant changes. Approximately 1000 aircraft engaged the French defense on 13 May using a persistent intermittent approach.[42] Within thirty minutes, the telephone lines linking the command and control elements of the 55 Infantry were cut.[43] The Stukas, with dive sirens screaming, delivered their ordnance without significant opposition from French antiaircraft weapons or French fighter aircraft.[44] The Germans delivered bombs and conducted strafing runs with remarkable precision, owing to an earlier special air reconnaissance mission that photographed the defensive positions in the zone.[45]

What unfolded on the 13th of May seems in retrospect to be a close conceptual parallel to Janis's findings in the 1951 RAND study. The massive use of air power in an intermittent, suppressive fashion prevented the inspection of bomb damage and limited the activity of leaders and medical personnel. The Stuka sirens announced weapons

effects that the French could not defend against. Luftwaffe bombers and divisional field artillery added unannounced strikes which prevented the adaptation to Stuka sirens as a reliable danger cue. Leaders could not communicate with superiors or subordinates because the accurate bombing crippled communications.

The issue of communication is particularly significant. It emerges as a factor in organized research and anecdotal accounts as well. S. L. A. Marshall once observed, "Nothing is more likely to break the nerve of an intelligent and sensitive young commander in the aftermath of a costly and bloodletting experience than to leave him alone with his thoughts. That holds true also of the men under him. Men need to talk it out."[46] A goal, then, for offensive psychological warfare may be to leave the enemy alone with his thoughts by targeting command and control elements whenever possible.

In addition to Janis's array of potential causes, all five situational risk factors for CSR were present. The bombing was intense. The outcome was unpredictable. Because communications were poor, it would follow that there was a lack of clarity in information. Soldiers may have perceived the lack of French air defense or counterair aviation as a failure of leadership. French leaders at all levels were under fire and were undoubtedly wounded or killed. If the lessons of modern psychological analysis could have been applied to the tactical situation at Sedan the clear prediction would have been a large number of psychological casualties, and perhaps contagious fear--a panic.

One of the clearest English language descriptions of the outcome is by Rothbrust:

> Although later investigations revealed that fewer personnel were killed and equipment destroyed than originally anticipated, the demoralizing effect of the Stuka took its toll, severing the nerves of the defenders. . . resulting in a panic by evening. The remnants of the 55th Infantry Division, the entire 71st Infantry Division, the majority of five artillery regiments, and rear services began to rout south. . . Staffs, medical services, and anyone that could move joined this rout. French general staff officers were out to restore order; however, many of these became caught in the chaos. Elements of this panic-stricken mass fled as far as Reims, 80 km behind the front before they could be stopped.[47]

Conditions were ideal for individual instances of CSR to trigger widespread panic, and panic indeed occurred.

The Germans were able to break the French psychologically with an intense, periodic bombardment without the massive, physically overwhelming fires characteristic of the shock armies of the Soviet Union. The outcome bodes well for modern armies equipped with improved conventional and precision guided munitions. Such weapons are expensive and usually in short supply. Their psychological effectiveness will be due more to delivery characteristics and tactics than to sheer numbers.

Mastery of Mass

The principle of mass is of undeniable value in breaking the enemy at the tactical level, in both the physical and the psychological sense. The Soviet artillery concept of fire destruction is key to understanding how the intermittent schedule (in Janis's terms, the variable interval pattern) is established in massed fires. Ognevoye porazheniye, which is translated in English to fire destruction, holds meaning in Russian as medical paralysis or stroke.[48] In Soviet doctrine, the purpose of fire destruction is to make an organized defense impossible for the enemy to conduct. Bellamy notes, "The crushing effect of artillery fire on morale is therefore

as much a part of fire destruction as its physical effect on people, in destroying equipment, cutting communications and blinding target acquisition."[49] To achieve such effects, fires must mass at points in time and points on the ground. For logistical reasons as well as psychological effects, the tactics of massed fires require them to pulse intermittently.

The effectiveness of massed, intermittent delivery schedules contributed to a breakthrough during 1 Ukrainian Front operations in the Vistula-Oder Operation, 12 January-3 February 1945. The Russians organized four fronts for the operation: 1 and 2 Belorussian, and 1 and 4 Ukrainian. The fronts massed artillery forward. For example, in the 8 Guards Army sector there were 350 pieces of medium and heavy artillery □per kilometer□ of front.[50] Simple mathematics indicates that the artillery commander could have positioned the guns hub to hub across the entire zone of attack. On average, firing one round per minute at 100 pounds per round, this artillery force must have been capable of putting about 200 tons of ordnance in the air per minute, along a seven to ten kilometer segment of breakthrough frontage.

On the morning of 12 January, the reconnaissance elements of the 1 Ukrainian fought a battle in the security zone of the defending German forces. They effected a penetration of approximately three kilometers, which permitted direct observation of many of the German positions.[51] In addition, many German units displaced to respond to the penetration, enabling the Russians to develop refined fire plans. The initiative was now held by the Russian artillery. The Germans would never regain it.

Bellamy's Red God of War gives an apt account of the fires of the 1 Ukrainian and the effect of these fires on the German force.

> . . .the hundred and seven minute preparation of the main forces' attack began: a fifteen minute fire blow on targets throughout the tactical depth, then forty minutes of deliberate fire. Then came the seven minute strike on the enemy artillery network, which neutralized it as intended. Then came another thirty minutes of deliberate fire and a fifteen minute fire blow. At this stage, according to prisoner reports, large numbers of Germans became disorientated (sic) and began streaming, panic stricken, to the rear.[52]

Single massive blows at the tactical level do not appear to cause large numbers of debilitating fear responses or widespread panic. Only when the massive fires pulse intermittently onto the targeted force does the enemy break. In this case, the breakdown appeared to occur after a third massive fire blow, in the context of an extended preparation.

Admittedly, there are exceptions to the intermittent mass principle. During the reduction of the city of Berlin in April of 1945, Russian forces made use of direct fire artillery in urban terrain. It was suited to the overall plan, which was to divide the city into a grid of small blocks. Each block would then be deliberately attacked and reduced, three hundred blocks per day.[53] The following passage, again from the Red God of War, is an excellent characterization of both the technique and the relevant psychological impact of the fires:

> Along the Avenue Unter den Linden, 500 pieces of artillery were drawn up along a stretch of less than a kilometre. Sometimes, a hail of a thousand shells crashed down on a single group of houses. So terrifying was the effect of this that, out of a group of 130 survivors taken prisoner in the cellars of the Air Ministry, seventeen had gone mad (emphasis original).[54]

At thirteen percent, the ratio of psychological casualties to survivors was not unusually high. It is impossible to determine exactly what the delivery technique was, although it is likely that fewer than three volleys were delivered into the structure. Certainly there was no prolonged

bombardment. It is also likely that the survivors experienced "near misses" during the direct fire assault.

Despite the successes of the Soviet artillery, massive fires do not guarantee tactically significant combat stress reactions, just as they do not guarantee success in other ways. During the 1916 British Expeditionary Force offensive at the Somme the German trench defenses held despite the efforts of a powerful British artillery organization employed with careful planning.

After the designation of 1 July, 1916, as the opening date for the Somme offensive, detailed preparations began for artillery support of the thirty two division attack.[55] The general concept for fires was to prepare the depth of the German position for five days, and then to support a synchronized ground attack with a barrage that the artillerymen would carefully lift in advance of assaulting infantry. Although conceptually simple, the plan required complex coordination to bring to bear cannon of various range and destructive capabilities. It also required a massive logistical effort, with more than 2,960,000 rounds prestocked in forward areas to support the fire plan.[56]

The artillery arrayed for the offensive was weak in both technical and tactical capability. Too many guns were allocated to counterbattery at the expense of the preparatory bombardment, there were insufficient numbers of heavy weapons, smoke munitions, and no gas shells.[57] The most serious failing was the inability of artillery observers to synchronize the creeping barrage with the advance of the infantry.[58] The attacking soldiers would learn a tragic lesson about the excessive centralized control of artillery in the offense.

The bombardment began on the 24th of June and, because of a postponement of the infantry assault, proceeded two days beyond the five days required in the original plan. John Keegan, the famous British military historian, estimates that within the first few kilometers of the German defensive sector, "each 2500 square yards had received a ton of shells. . . [and] each 1000 square yards had received 30 shells."[59] Keegan notes that about one million of the shells in the bombardment were shrapnel. The iron or steel pellets from this type of munition had little apparent effect on the wire, the earthworks, or the nerve of the German defenders.

Close appraisal of the artillery plan shows that other factors favored the Germans. Each morning the Allied fires began at exactly 6:25 AM and continued until 7:45 AM.[60] The intent was to surprise the Germans with a short barrage the day of the attack, but in doing so the British and French lost the psychological advantage of a variable bombardment interval. The intensity of the bombardment slackened at night, thus the psychological advantage of night delivery was lost.[61] To make matters worse, the Germans were able to predict the exact time of the attack, predict the firing of mines as a signal of H-Hour, and convey the information to squad level[62]. Unpredictability and night delivery, contributors to CSR, were replaced by increased communication and the identification of danger cues--adjustment mechanisms.

German machinegunners and the infantry of the British and French forces raced one another for the initiative after each successive supporting barrage shifted to the next objective. At the risk of oversimplifying a complex campaign that lasted more than three and one half months, the British and French consistently lost that race. Their

combined casualties approached 620,000, as compared to 450,000 German dead.[63] Although the artillery used in the operation was massive, it apparently did not achieve mass in the sense of overwhelming fires at decisive points. Although there were no doubt instances of CSR among the entrenched German defenders, the British artillery tactics lacked the unpredictability and uncertainty that can change fear to terror.

The lessons of Sedan and the Somme put the offensive value of combat stress reaction in perspective. Sedan demonstrates the potential value of psychological effects when the attacker may lack other aspects of combat power. The Somme shows that such effects must be earned through careful analysis and execution. The British chose a predictable pattern to help gain surprise, which they lost nonetheless. They could have delivered the same munitions onto the same targets at night in a variable pattern that would have frightened the Germans more than the predictable morning poundings that they successfully endured.

Good Men, Bad Effects

Soviet experience, Sedan, and the Somme show that the results of CSR in units can be dramatic. CSR, by definition, is an individual's response. There is a need for historical study at that level as well. Although the conditions of combat make it difficult for professional researchers to study psychological effects at the individual level, history has a way of putting the right person in the right place at the right time. In June 1942, an American psychiatrist named Herbert Spiegel received orders to serve as an assistant battalion surgeon with the 1st U. S. Infantry Division.[64] He deployed to North Africa with the division and worked as a battalion medical officer during intense fighting in the Tunisian Campaign. He was able to witness what psychiatrists would

later call combat stress reaction firsthand. Spiegel's writings paved the way for viewing stress reactions as situationally determined, rather than a personality problem. He was an early proponent of treating psychological casualties with minimal evacuation, and effected such treatment by requiring his patients to spend time in the battalion rear with the kitchen crew.[65]

Spiegel illustrated his treatment with an anecdote about a superb platoon staff sergeant--a two year veteran of the 1st Division with considerable combat experience--who was temporarily debilitated by a "near miss" experience.

> For two months, he had been on nightly patrol duty in the Ousseltia Valley (Tunisia). One morning, after launching an attack with his platoon, he reached his objective--a hill which had to be held for further operations. Shortly after he took the hill, the enemy counterattacked. . . Shells from the mortars began coming in. Several landed near him, one very close. But he was only stunned, not hit. He managed to continue the fighting and to maintain his objective for one hour. During this time, however, he became tremulous and unable to hold his rifle. Helped by another soldier, he came back to the aid station with gross tremors and a sickly smile. 'Don't send me back to the rear. I'll be all right!' he insisted. He was given a cigarette, which he could not light because of his tremors. He tried to joke about it. He was sent to the kitchen area for two days and nights. When he came back he had lost most of his tremors, but he now had a tic in the form of eyeblinking and head twitching. He was still tense, but eager to rejoin his outfit.[66]

This account reinforces the RAND proposal on "near miss" experiences discussed in Section I. That the victim was an excellent small unit leader further underscores the tactical significance of combat stress response by showing that even well-trained, experienced soldiers develop CSR. It is the situation, not the soldier's personality or disposition, that leads to the reaction.

This quick combat stress reaction typical of "near miss" experiences is a purely psychological effect, and not brought on by the physical effects of blast, as the following account demonstrates. At the Battle of Eylau in 1807, a French infantry formation attacked a Russian defense, meeting stiff resistance.[67] A mounted French tactical officer became the luckiest man on the battlefield when a Russian fieldpiece launched a cannonball that took off his shako, but caused him no physical injuries. The officer reported, "I seemed to be blotted out of existence, but I did not fall from my horse. Nevertheless, I could still hear and see, and I preserved all my intellectual faculties, although my limbs were paralyzed to such an extent that I could not move a single finger."[68] The French officer remained paralyzed for several hours, then recovered fully.

Speigel's noncommissioned officer developed CSR when sights, sounds, violent tactile effects, and smells of the mortar near miss bombarded his senses. It would be incorrect, however, to argue that sensory overload causes CSR. Clearly, this was not the case with the French officer discussed above. His near-miss experience was primarily visual (though admittedly in the context of "high adventure"). The visual signature of a weapon is a significant contributor in most historical accounts of CSR, and is discussed by every psychological researcher cited in this paper. Enhanced or variable visual signature may therefore be a desirable and relatively inexpensive design feature for new weapons.

Summary

These historical findings show the practical validity of psychological studies of CSR. Fear can clearly be elicited out of proportion with the actual destructive potential of weapons. Fear can indeed be a combat

multiplier--as the early psychological studies suggested. The visual signature of weapons plays a key role in causing extreme fear. Limiting the communicative abilities of soldiers under fire attenuates their adjustment to fear. Massed fires, while not a panacea, can cause widespread CSR if the guns deliver appropriate munitions on an intermittent schedule. A human element also emerged in the historical accounts suggesting that virtually all soldiers, even exceptional troop leaders, are vulnerable to CSR.

Analyses in Sections I and II revealed implications for warfighting. Section III applies those implications to the newest modern indirect fire weapons. It recognizes that historical and psychological research converges on specific circumstances that often result in combat stress reactions. It organizes these as delivery characteristics and techniques, and then attempts to describe specific weapons systems' relative potentials for eliciting debilitating fear. The intended result is a better understanding of how to use modern weapons to cause fear.

Section III

Modern Weapons and the Production of Fear

The research findings and historical accounts discussed in this paper strongly suggest that certain delivery tactics and design features contribute to strong fear responses such as combat stress reaction. These tactics and design features therefore have militarily significant effects. No one can measure the degree to which these effects influence the outcome of a past or future battle. It is worthwhile, however, to estimate the direction of the effects. The direction, clearly, is toward the emotional defeat of the enemy.

An examination of the design features of smart weapons with a view toward the production of fear serves to illustrate specific tactics for smart weapon employment. A smart weapon is any weapon system that has, "the capability to search for, detect, discriminate between, select and engage targets."[69] Smart weapons include precision munitions that are guided by an operator as well as munitions that, upon launch, autonomously seek out and destroy targets. If wisely used, smart weapons offer commanders an increased capability to both destroy targets and elicit fear because they maximize efficiency and precision.

Smart weapons are accurate, lethal, and frequently give the operator increased control over delivery characteristics. Increased control over delivery means that these weapons may be used in tactically unique ways. Smart weapons are also expensive and likely to be in short supply. Commanders must therefore employ smart weapons efficiently. Efficient use means that the enemy is attacked at all levels--physically, psychologically, and emotionally. It also means that the commander must

understand fully each characteristic of the weapon and how each characteristic effects the enemy.

□Smart Weapons and Fear□

Each delivery tactic and design feature that emerges in psychological and historical research has implications for current or emerging smart weaponry. The significance of the earlier observations to smart weapons issues is as follows:

Near-miss experiences. Because they are precise, smart weapons minimize unintended collateral damage. Commanders can enhance the likelihood of near-miss experiences by the use of precision-guided improved conventional or cluster munitions. The use of Tomahawk Land Attack Missiles (TLAM-D) or other smart cluster munitions[70] is likely to enhance fear by giving a more even distribution of effects in the target area. Direct hits on hard targets are characteristic of smart weapons. Smart delivery therefore enables those who experience the near-miss to associate the intense fear with the military equipment or facility that the munition struck.

Anticipation of effects. It is intuitively appealing to imagine a silent weapon that destroys tanks and other hard targets with absolutely no warning. The historical and psychological research findings, however, repeatedly show that a weapon produces the most fear when it allows the target to briefly anticipate the coming effects. To achieve the unpredictability cited by researchers, a mixture of announced and unannounced effects should maximize fearfulness. A selective whistle-on, whistle-off feature could serve as an inexpensive and highly desirable design characteristic for smart weapons. A magnesium flash mixture added to base ejection charges would be an effective visual signature. Of

course, it would be counterproductive if the signature helped the enemy effectively defend himself. The existence of countermeasures depending on such cues would necessitate purely unannounced delivery tactics.

Variable or long interval pattern. As the results of the Somme preparation suggest, soldiers cope best when under indirect attack continuously or at regular intervals. Therefore, an intermittent, unpredictable engagement tactic is best for fixed sites and other immobile targets. As in the case of anticipated effects, one must consider the ability of the enemy to evacuate, relocate, or employ countermeasures. Time-on-target remains the best way to mass fires on mobile targets. When other considerations permit, however, the intermittent employment of smart weapons will be more frightening than a single simultaneous strike.

Limited activity after indirect attack. When soldiers cannot resume activity after a raid, fear grows. Smart weapons should ideally include a precision munition to destroy the target, as well as short-duration delayed or sensor-fused submunitions to prevent the resumption of activity. As the Army designs brilliant munitions[71], developers should give consideration to attack-reattack cycles that initially destroy equipment and then loiter to suppress recovery activity with mines or direct action.

High explosives versus incendiaries. Janis observed that explosions tend to cause greater fear than incendiaries.[72] This finding has little relevance in smart weapons tactics or design, except to note that the precision guidance inherent to most smart weapons brings the explosive detonations in closer proximity with the target, enhancing the fear response (and physical effects as well).

Night attack. The research and historical evidence clearly show that indirect fire weapons, including smart weapons, will cause greater fear if employed after dark. Most smart weapons work equally well day or night, although some with television guidance[73] perform better in daylight. Another design consideration might include some form of pre-initiation strobe that would be the nighttime visual counterpart to anticipatory cues such as whistles.

Smart Attack of Coping Mechanisms

After the initial fear responses emerge, adjustment occurs. It is as critical to disrupt the adjustment processes as it is to cause the basic emotional reaction. This is difficult to accomplish because coping mechanisms are complex. Attacking one mechanism may enhance the effectiveness of a different mechanism—Stuka sirens created fear but also gave early warning. The following smart weapons issues involve the prevention of soldiers' adjustment to previous attack:

Increased communicativeness. The inability to communicate with leaders and peers contributes to CSR. The most efficient way to use modern weapons to limit such communication is to attack communications at all levels. Constructive activity and communications must cease, and sensor-fuzed submunitions or scatterable mines on a garrison or fixed position at night would require frantic and dangerous clearing efforts. The accompanying social isolation would reduce communication. In special circumstances, cluster munitions might include several bursting canisters filled with HC smoke, causing the enemy commander to increase his chemical protective posture. The tactical commander would have to weigh the benefits of trickery against the risks of retaliation or escalation. This is particularly true because media representatives from either side

may witness the bombardment, misinterpret the effects, and report them as real.

Satisfying curiosity about damage. The tactics of limiting enemy movement as discussed earlier apply here as well. The commander can also help defeat this coping mechanism by attacking shortly after dark whenever possible. Darkness will prolong the delay between the engagement and close inspection of the damage.

Discrimination of danger cues. Soldiers may use anticipatory sounds or discover engagement patterns that help them to recognize when they are vulnerable. Intermittent delivery techniques can interfere with this coping mechanism. Ideally, anticipatory cues such as whistles or strobes should be mixed with silent versions of the same munition to prevent consistent discrimination of danger cues.

Fatalistic attitudes. This coping strategy is most often found among those who are subject to attack without anticipation or warning. Their attitude is that death is either random or at the direction of a supreme being. Smart weapons give commanders the capability to demonstrate to the enemy that death is not random. A precision attack by a smart weapon reveals what was targeted and suggests why it was targeted. In the face of such obvious, rational cues, fatalism will be more difficult to establish and coping with fear will be more difficult. If tanks and radar sites are engaged selectively with precision weapons, specific battlefield functions such as "tank crewmember" or "radar operator" will become extremely stressful. Ideally, enemy soldiers will eventually refuse to fill such key positions, in part because selective strikes make it more difficult to attribute death to bad luck or the will of God. A potential disadvantage is that soldiers who do not fill targeted positions may become less afraid.

Emerging Systems

As new indirect fire systems emerge, one can compare the new design features with those of the older system to estimate the ability of the emerging system to enhance fear. One such comparison is the 155 millimeter howitzer's current M483 Dual Purpose Improved Conventional Munition (DPICM) round with the emerging Seek and Destroy Armor (SADARM) round. The DPICM round is the current munition of choice for counterbattery fires. By the end of the 4th quarter fiscal year 1994, SADARM will be held in war reserve and will supplant DPICM as the munition of choice in the counterbattery role.[74]

Unlike the DPICM round, which ejects 88 armor piercing shaped charge submunitions from its base, SADARM ejects two smart submunitions. These independent submunitions are stabilized by ellipsoid drogue parachutes until onboard millimeter wave and infrared sensors detect an armored vehicle below. The submunitions then detonate, forging a single explosively formed penetrator (EFP) that strikes the vehicle. Unlike ordinary fragmentation, the EFP forms to a specific ballistic shape and strikes the target at a velocity approximately twice that of a kinetic energy tank round. SADARM is a mature technology as opposed to a concept; there is a German version (named ZEPL), a Swedish version (named BONUS), and other armies are developing versions delivered by cannon, rocket, or aircraft.[75] In 1st quarter fiscal year 1996, the U. S. plans to field a six submunition rocket for the Multiple Launch Rocket System (MLRS) rocket pod container.[76]

A comparison of DPICM and SADARM using the factors associated with combat stress response (CSR) strongly suggest that SADARM engagements will cause increased CSR among the enemy. Soldiers who

escape death because they were outside their vehicle when the penetrator destroys it are likely to consider the experience a near-miss. SADARM drogue parachutes may give enemy soldiers frightening visual anticipatory cues as the submunitions descend to their detonation altitude (eg. approximately 150 meters). The perceived intensity of the engagement could be stunning--a single battalion volley would place 48 SADARM submunitions over an enemy artillery position.

Conventional artillery tactics would further enhance the fear-producing aspects of SADARM. Night attack would be terrifying, but the addition of an illumination flare could backlight SADARM's visual signature and enhance fear. To limit activity after the raid and enhance the overall lethality of the bombardment, one tactic would be to deliver mixed volleys of SADARM and Area Denial Artillery Munitions (ADAM), forcing the enemy to choose between staying in the targeted vehicles or negotiating artillery delivered antipersonnel mines. Because the SADARM sensor technology is multispectral (millimeter wave and infrared), battlefield smoke will not significantly degrade the sensors.[77] The commander might therefore prepare the enemy position with HC smoke, producing the confusion and lack of clarity often associated with CSR.

These proposed tactics for enhancing CSR are not based on uninformed speculation or intuitive appeal. They instead flow from an analysis of psychological and historical research. By matching the design characteristics and employment techniques of emerging weapons with factors that have led to CSR in the past, planners can develop reasonable predictions about psychological effects. Future battles will test these predictions. Smart weapons give commanders the capability to destroy

targets efficiently. The present paper suggests they may make commanders more fearsome as well.

CONCLUSION

Commanders can tailor their indirect fire tactics to attack the enemy psychologically as well as physically. Combat stress reaction has military significance at the tactical level, and each targeting decision must recognize the most likely psychological end state. An analytic approach using both psychology and historical study is the best way--short of actual battlefield use--to derive the appropriate tactics.

Ideally, researchers would study CSR in a psychological laboratory under controlled conditions, and focus basic and applied research on its underpinnings. Both the nature of human emotions and the realities of war ensure that scientists will seldom study CSR under such convenient circumstances. Survey techniques, content analysis, and naturalistic observation will remain the primary research techniques in the study of fear in war.

Military history has much to offer the psychologist or sociologist who seeks to understand emotions in the context of battle. One man's fear may seem irrelevant out of historical context; historical case studies reveal that when one man breaks, others follow. If fear can change a fight, it can change the course of battles, campaigns, and wars. Historical analysis confirms that a soldier's fears are neither petty nor insignificant, nor entirely under his control, and that victory is often less dependent on force ratios than one might hope.

One purpose of research is to predict future outcomes. Whether history and psychology can reveal the best tactics to use with emerging weapons is open to test. It is difficult to study the emotional effects of weapons without both perspectives. Some soldiers may argue that

history and psychology are irrelevant, that experience and judgment form the basis for all tactical decisions. Insofar as experience is personal history and judgment is naive psychology, they are indeed correct.

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